

Utilizing CAD/CAM Trios
for Restoring a
Medically Compromised Patient

Laura Ye

CC: “I’m here to get all of my teeth fixed, finally.”

- 61F
- First came to UOP for screening virtually on 01/11/2021
- Drives 2 hours away to come to the dental school



Heath History

- **Medical Hx:** atypical tachycardia, chronic back pain, anxiety, hypertension
- **Surgical Hx:** foot surgery for crushed foot in escalator
- **Allergies:** Amoxicillin, Metoprolol
- **Medications:** Cymbalta (antidepressant), adderall, Valium, Losartan, Protonix (GERD), Oxycodone

Dental History

- Not a very regular dental home due to dental anxiety
 - Had only emergency treatment done in the past few years
- Could not start reconstructive tx due to high costs in private practice
- Heavily restored, implants placed a few years ago in private practice
- Bruxism

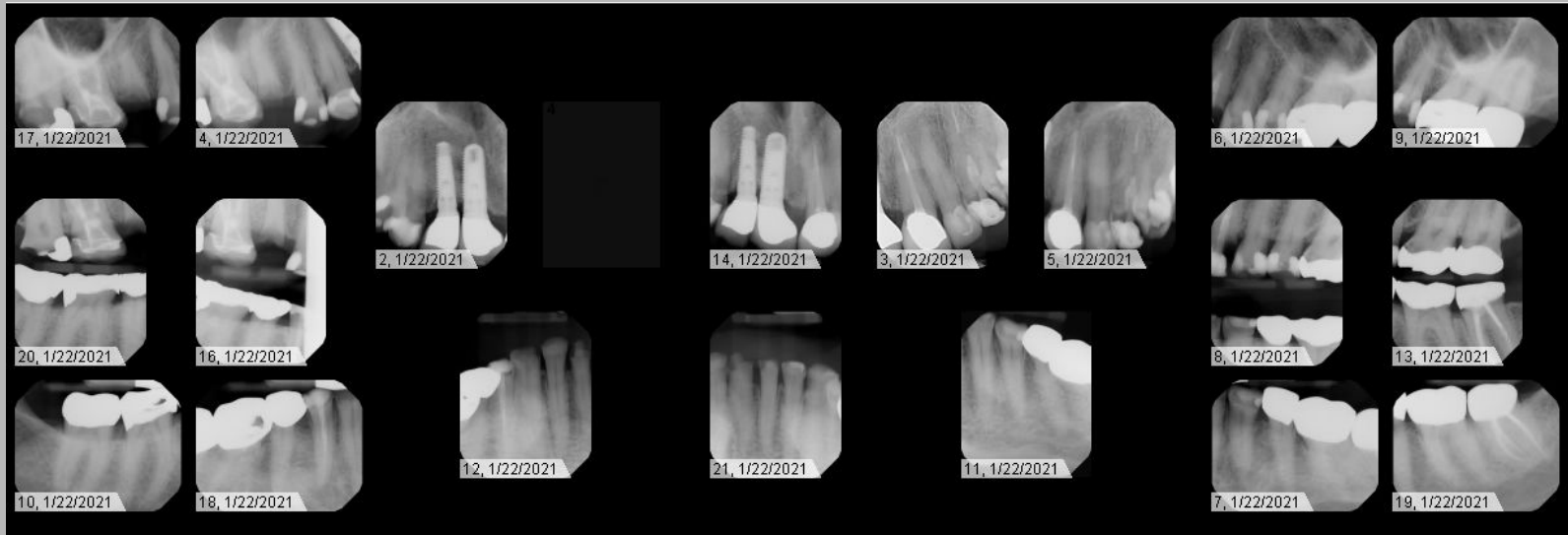
Pre-Op Photos: Intraoral



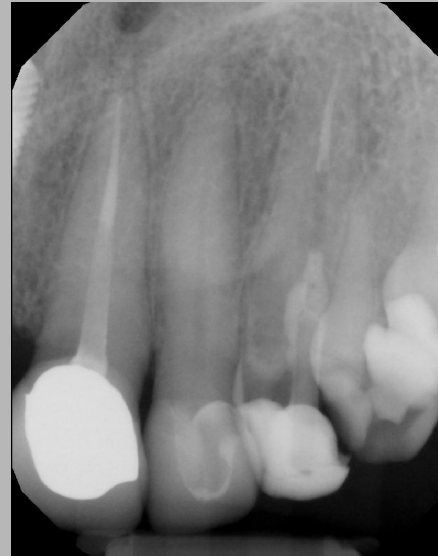
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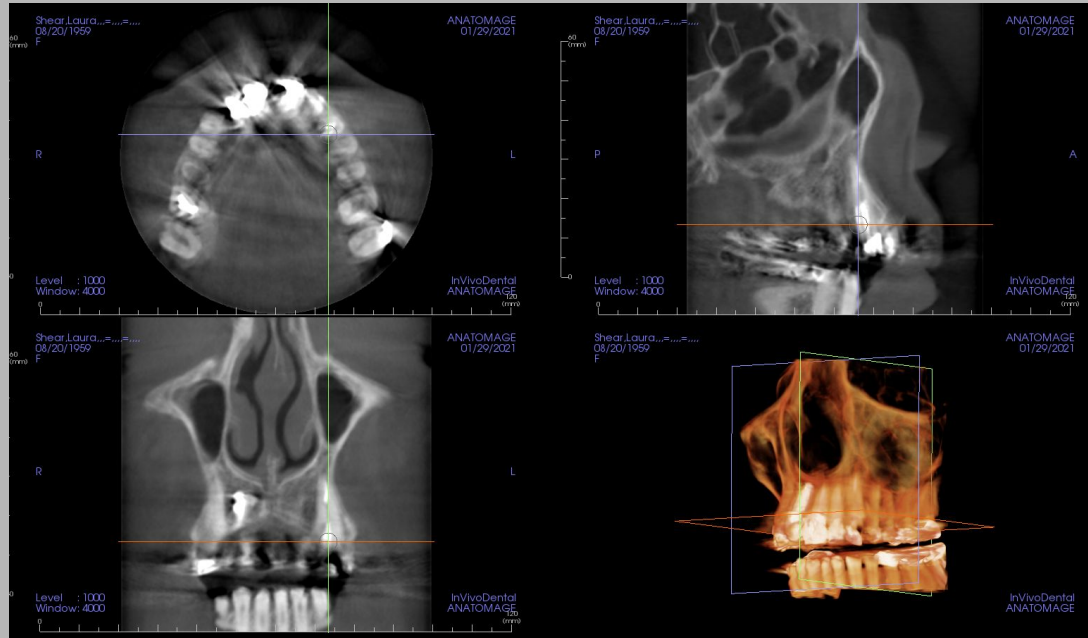
Radiographic Findings



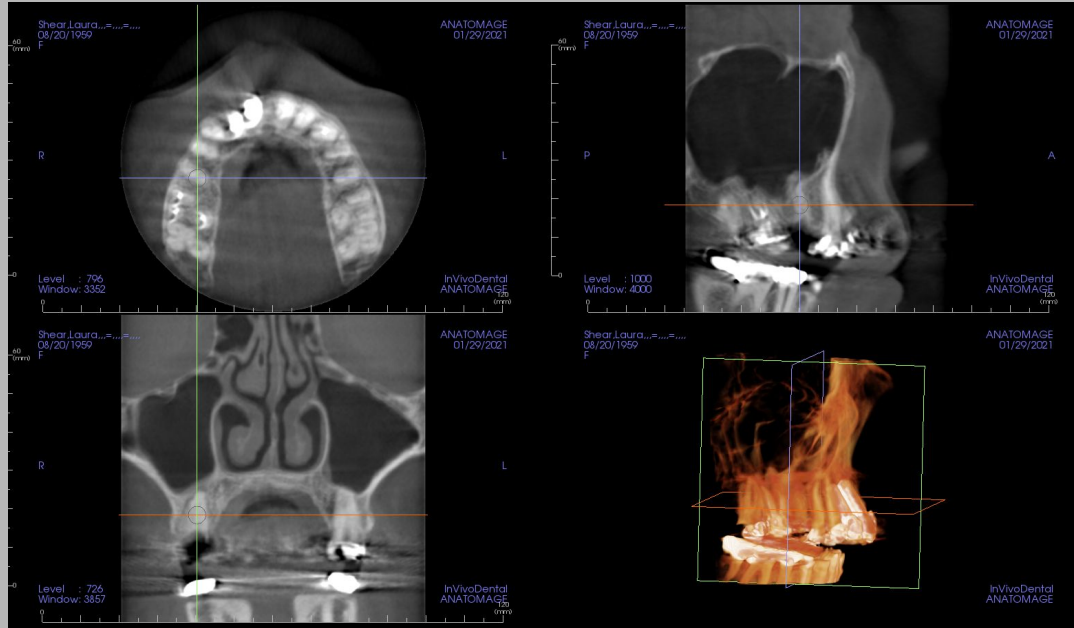
Radiographic Findings



CBCT #11



CBCT #4



VDO: to Open or Not to Open?



- Goal of Full Mouth Rehabilitation: restore normal healthy function of masticating apparatus
 - Aesthetics, alter occlusal relationship, allow space for restorations
- Pt goals:
 - Maintaining lower costs
 - Less esthetically inclined
 - Does not want removable prosthetic
 - Had not gone to dentist in many years due to dental phobia

Upadhyay, SreeTheja, et al. "Full-Mouth Rehabilitation of Severely Mutilated Dentition with Loss of Vertical Dimension Using an Interdisciplinary Approach." Journal of Interdisciplinary Dentistry, vol. 9, no. 2, 2019, p. 73., doi:10.4103/jid.jid_5_18.

Treatment Plans: Opening VDO

Ideal Tx Plan

Phase I: Maintenance

1. Prophy, CTX4 rinse

Phase II: Extractions

2. EXT #4, 11
3. Bone Graft #4, 11
4. Maxillary Resin Stayplate

Phase III: Posterior VDO Opening

5. BU + Zirconia Crowns #12, 13, 14
6. BU + Zirconia Crowns #2, 3, 5, 6
7. BU + Zirconia Crowns #18, 19, 20

8. BU + Zirconia Crowns #29, 30, 31

Phase IV: Anterior Esthetics

7. #7, 8 Implant Crown re-do
8. #9 Crown re-do
9. BU + Zirconia Crowns #22, 23, 24, 25, 26, 27

Phase V: Maintenance

10. ITE
11. Occlusal Nightguard

Treatment Plan: Accepted Final Plan

Phase I: Maintenance

1. Propphy, CTX4 rinse, CTX2 spray

Phase II: Extractions

2. EXT #4, 11
3. Bone Graft #4, 11
4. Immediate Implant #4
5. Delayed Implant #11

Phase III: Maxillary Right Quadrant

6. BU #12, 13, 14
7. Zirconia Crowns #12, 13
8. Gold Crowns #14

Phase IV: Maxillary Left Quadrant

9. BU #2, 6
10. Zirconia Crown #6
11. Gold Crown #2

Phase V: Mandibular Anteriors

12. BU #23, 24, 25
13. Resin Composite #27
14. Zirconia Crowns #23, 24, 25

Phase VI: Mandibular Posteriors

15. BU #18, 30
16. Gold Crowns #18, 30

Phase VII: Maintenance

10. Occlusal Nightguard
11. ITE

Crown Material Selection

- Concerns:
 - Xerostomia
 - Bruxism
 - Anterior Esthetics
- Study: Monolithic Zirconia crowns in aesthetic zone of heavy grinders
 - Result: no significant biologic or technical complications of Zirconia crowns in bruxers
 - Patients were satisfied with esthetics and function



Hansen, Torbjørn Leif, et al. "Monolithic Zirconia Crowns in the Aesthetic Zone in Heavy Grinders with Severe Tooth Wear – An Observational Case-Series." Journal of Dentistry, vol. 72, 2018, pp. 14–20., doi:10.1016/j.jdent.2018.01.013.

Crown Material Selection



- Study: Ranking of Restorative Materials, focusing on the amount of wear in patients with bruxism
 - Gold and Ceramic: same amount of wear (microfilled resin 2.5x as much wear)
 - Ceramic + Microfilled resin chipped, but gold did not chip
- Conclusion:
 - Gold crowns on the very posterior teeth to reduce risk of chipping
 - Zirconia crowns on rest of teeth

Dahl, B L, and G Olio. "In Vivo Wear Ranking of Some Restorative Materials." Quintessence Int, 25 Aug. 1994.

Medication Induced Xerostomia Solutions

- Xerostomia treatment options:
 - Drinking more water
 - CTX2 maintenance spray
- Study: Xerostom chewing tablets of Xylitol + betaine (decreases chemical irritation) + olive oil (lubricant) vs non-stimulatory sorbitol tablet⁴
 - Result: XeroStom tablet increased salivary secretion volume and subjective feeling of xerostomia

Martín, Margarita, et al. "Products Based on Olive Oil, Betaine, and Xylitol in the Post-Radiotherapy Xerostomia." Reports of Practical Oncology & Radiotherapy, vol. 22, no. 1, 2017, pp. 71–76., doi:10.1016/j.rpor.2016.09.008.

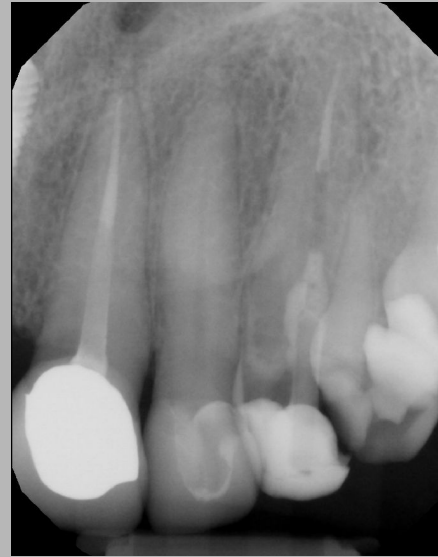
Medication Induced Xerostomia Solutions



- Study: Chewing gum vs spray
 - Compared sorbitol/xylitol chewing gum, sorbitol lozenge, and sorbitol/xylitol spray
 - Result: no significant difference in salivary flow volume and patient preferences between the three options
- Prescribed pt Carifree CTX2 moisturizing spray
 - Ingredients: 35% Xylitol + Potassium Sorbate

Stewart, Carol M., et al. "Comparison between Saliva Stimulants and a Saliva Substitute in Patients with Xerostomia and Hyposalivation." *Special Care in Dentistry*, vol. 18, no. 4, 1998, pp. 142–148., doi:10.1111/j.1754-4505.1998.tb01136.x.

Radiographic Findings



Immediate Implants vs Delayed Implants

- Study: Meta-analysis of survival rate of immediate placement implants
 - Literature states: High survival rate in immediate implants
 - Patients were highly satisfied regardless of immediate or delayed implant treatment concepts⁷
 - Key: good case selection
- Immediate implant on #4 depending on the amount of buccal bone after ext

Atieh, Momen A, et al. "Immediate Placement or Immediate Restoration/Loading of Single Implants for Molar Tooth Replacement: A Systematic Review and Meta-Analysis." International Journal of Oral & Maxillofacial Implants, vol. 25, no. 1, 2010.

Trios Scanning Final Impression vs. PVS Final Impression

- In vivo study of digital intraoral scanning vs conventional impression
 - Conclusion: Intraoral scanning crowns had statistically significantly better margin and internal adaptation before cementation
 - Clinical evaluation of either methods were shown to have similar marginal adaptation
- Clinical comparison of Trios scanning vs two-step silicone technique
 - Conclusion: Digital crowns had better interproximal contacts and marginal fit
 - Occlusal contacts and retention did not show significant differences

8. Haddadi, Yasser, et al. "Accuracy of Crowns Based on Digital Intraoral Scanning Compared to Conventional Impression—a Split-Mouth Randomised Clinical Study." *Clinical Oral Investigations*, vol. 23, no. 11, 2019

9. Berrendero, Santiago, et al. "Comparative Study of All-Ceramic Crowns Obtained from Conventional and Digital Impressions: Clinical Findings." *Clinical Oral Investigations*, vol. 23, no. 4, 2018, pp. 1745–1751., doi:10.1007/s00784-018-2606-8.

Crowns #12, 13, 14 Preps

Caries removal

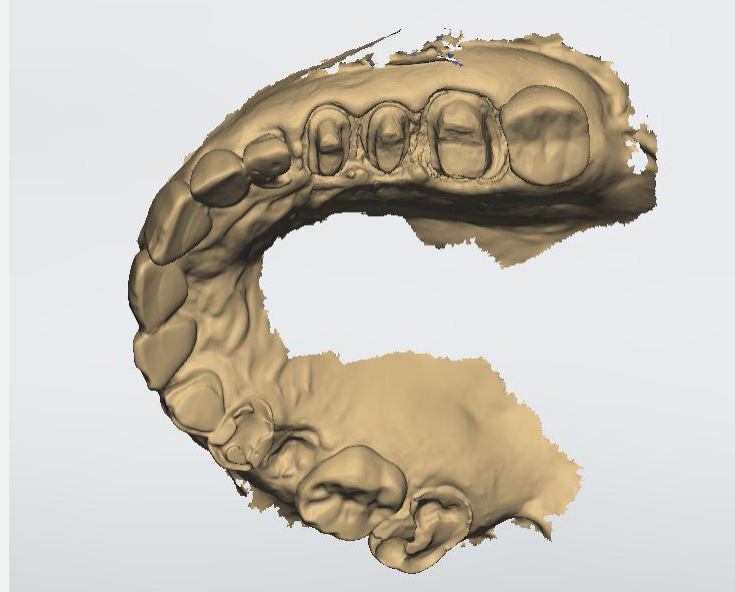
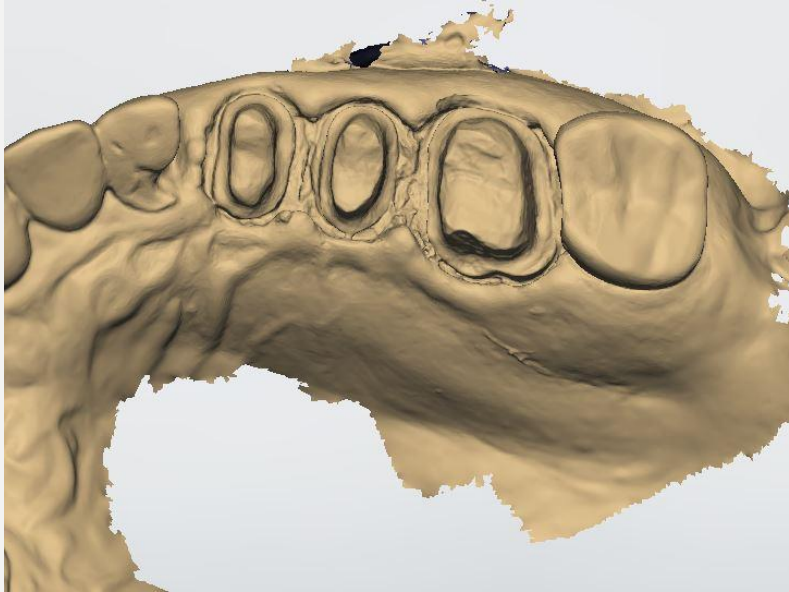


Preparations

Crowns #12, 13, 14 Digital Impression



Crowns #12, 13, 14 Digital Impression



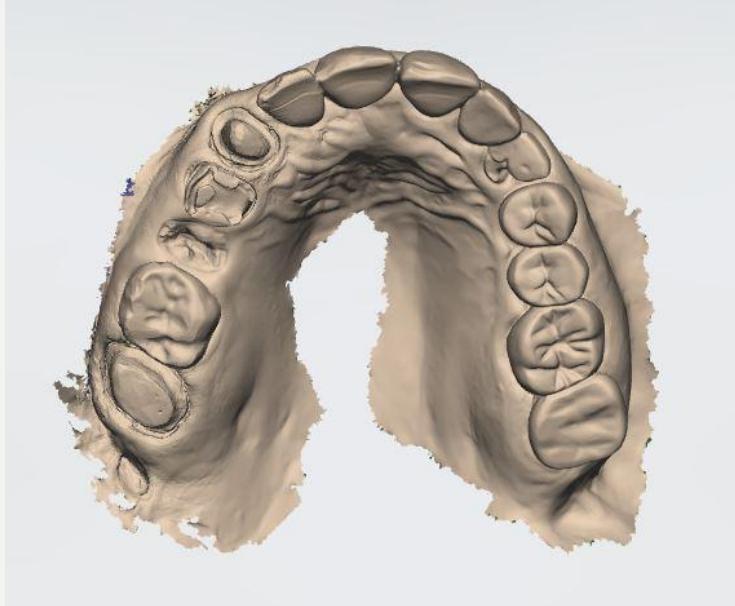
Crowns #12, 13, 14 Printed Impression



Crowns #2, 6 Digital Impression



Crowns #2, 6 Digital Impression



Crowns #2, 6 Printed Impression



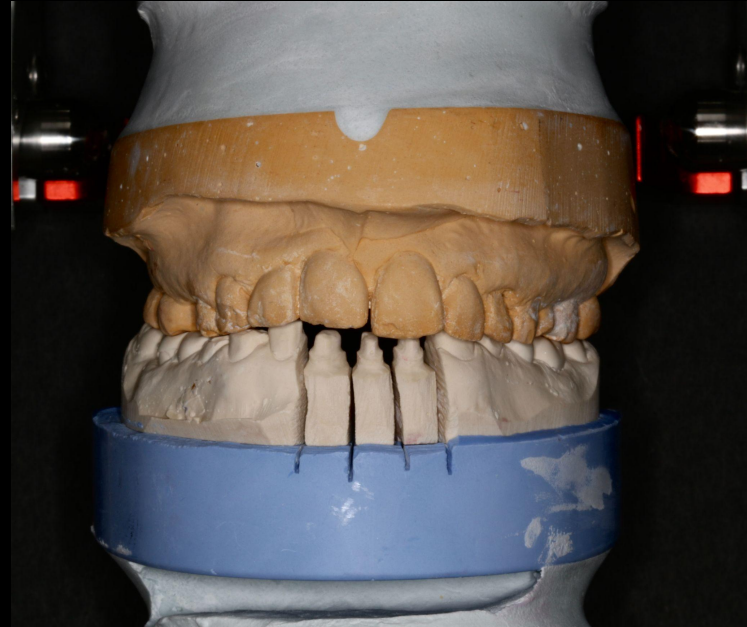
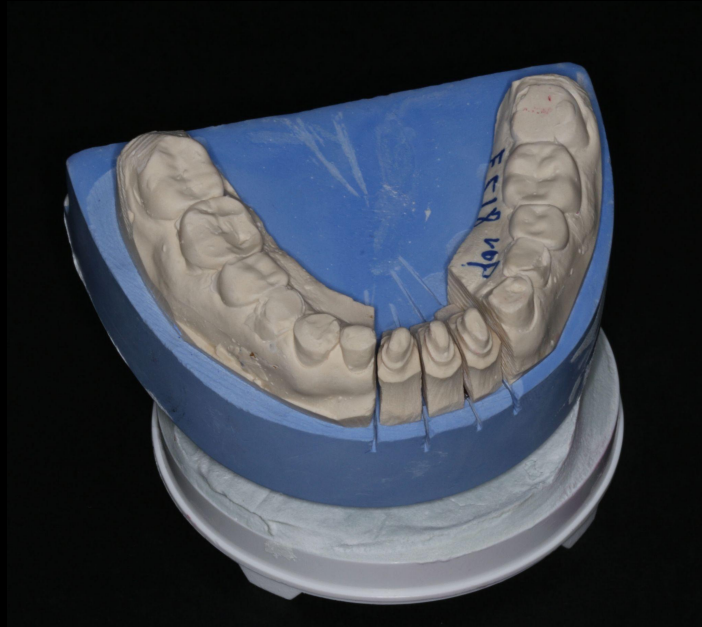
Anterior Build-Up



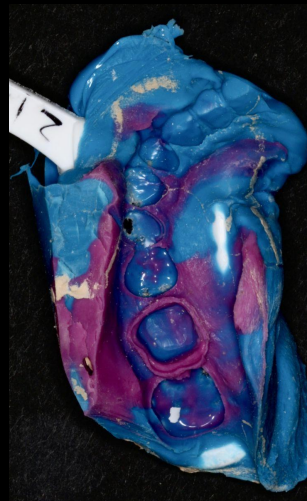
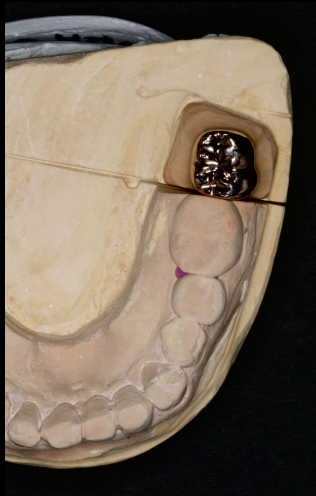
Anterior Preps



Anterior Conventional Impression



#18, 30 Gold Crowns Conventional + Triple Tray



Trios Scanning Final Impression VS. PVS Final Impression



- ***Patient Preferences***
 - Patient Feedback
 - “I definitely liked the scanner better than the goopy stuff”
 - “I’d say it’s more comfortable and there’s less clean-up after”
 - Pt preference ranking:
 1. Trios Scanning Technique
 2. Triple-Tray PVS
 3. Full-Arch PVS

Operator Preferences

Intraoral Trios Scanning

- Speed
- Ability to fix some areas while locking in other areas of prep
- Saves and records impression for future use, or in case models get lost
- Records bite
- Can be completed with one operator (do not need assistant)

Conventional Impression

- Reaches to some deeper areas that the Trios scanner could not catch
- Easier to capture terminal tooth in arch with conventional impression vs Trios scanner

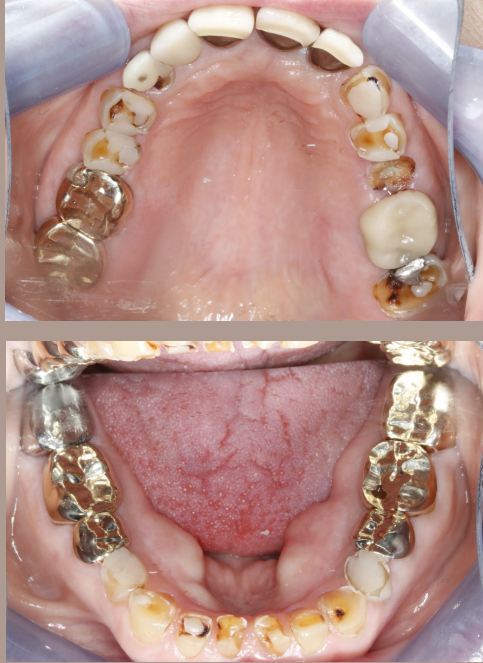
Final Photos



Final Photos



BEFORE



AFTER



A very special thanks to all of the faculty and staff involved in this case: Dr. Shika Gupta, Dr. Glen Hebert, Dr. Ed Orson, Dr. Eduardo Gonzalez, Marietta Daniel, and Maria Beltran.

References

1. Upadhyay, SreeTheja, et al. "Full-Mouth Rehabilitation of Severely Mutilated Dentition with Loss of Vertical Dimension Using an Interdisciplinary Approach." *Journal of Interdisciplinary Dentistry*, vol. 9, no. 2, 2019, p. 73., doi:10.4103/jid.jid_5_18.
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5. Stewart, Carol M., et al. "Comparison between Saliva Stimulants and a Saliva Substitute in Patients with Xerostomia and Hyposalivation." *Special Care in Dentistry*, vol. 18, no. 4, 1998, pp. 142–148., doi:10.1111/j.1754-4505.1998.tb01136.x.
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7. Schropp, Lars, et al. "Patient Experience of, and Satisfaction with, Delayed-Immediate vs. Delayed Single-Tooth Implant Placement." *Clinical Oral Implants Research*, vol. 15, no. 4, 2004, pp. 498–503., doi:10.1111/j.1600-0501.2004.01033.x.
8. Haddadi, Yasser, et al. "Accuracy of Crowns Based on Digital Intraoral Scanning Compared to Conventional Impression—a Split-Mouth Randomised Clinical Study." *Clinical Oral Investigations*, vol. 23, no. 11, 2019, pp. 4043–4050., doi:10.1007/s00784-019-02840-0.
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